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BOOK REVIEW

Human Embryonic Stem Cells. Edited by J. Odorico, S. Zhang and R. Pedersen. (Pp. xxii + 391, illustrated, ISBN 18599 62785, £80 hardback.) Abingdon, UK: BIOS Scientific/Garland Science.

It is now nearly seven years since the first description of human embryonic stem (ES) cell lines was published by Jamie Thomson. That event, closely apposed to the reports of the cloning of sheep ('Dolly'), and then mice, by somatic nuclear transfer, catalysed substantial interest in the idea of regenerative medicine and the possibility that stem cells of all sorts might be harnessed for the replacement of tissues lost to accident or disease. At about the same time, a number of papers appeared, reporting that various somatic stem cells – which were previously thought to be committed to lineages from within their tissue of origin – might indeed exhibit substantial plasticity and be able to generate terminally differentiated cells corresponding to a much wider range of cell types. Thus, the current era of stem cell biology was born, though the concept of stem cells and their application in medicine is much older.

One consequence of this resurgent interest in stem cell biology has been the publishing of several multi-author volumes devoted to stem cells and their potential. The volume *Human Embryonic Stem Cells*, edited by J. Odorico, S. Zhang and R. Pedersen, is the latest in a series produced by different publishing houses over the past few years. Paradoxically, however, as Jamie Thomson points out in his foreword to the present volume, progress in the field has been slow over this time. Prospects for adult stem cells have been dimmed by controversy over the phenomenon of 'plasticity', with the suggestion that at least some of the reported cases might be artefactual, depending upon cell fusion or rare transdifferentiation events. At the same time, progress with human ES cells was initially hindered by the difficulty of access to established lines, and the complexity of maintaining and expanding the cultures when they could be obtained.

Although mouse ES cells have been available for over 20 years, they have mostly been used as tools to produce transgenic mice. With notable exceptions, few have investigated their cell biology for its own sake, and so there has been relatively little experience from studies of mouse ES cells to guide the study of their human counterparts. The development of ES cell lines was a systematic progression from the study of teratocarcinomas in the 1970s, by those who thought that these tumours might provide key insights into the mechanisms of embryonic development. It is then perhaps ironic that clues about how to control the behaviour of human ES cells in culture are now being provided by our detailed knowledge of developmental genetics, especially of the mouse.

However, the human ES cell field is changing. Many laboratories in many countries have now derived human ES cell lines. In the current International Stem Cell Initiative, a collaborative venture to compare the properties of human ES cell lines derived worldwide, 75 independent lines derived in 17 laboratories and ten countries have been enrolled in the study. Meanwhile, reports are now beginning to appear in prominent journals, addressing the molecular mechanisms of human ES cell proliferation and differentiation – not merely describing their characteristics and potential for diverse differentiation.

The present volume, unlike many of its competitors, focuses explicitly on human ES cells, and may be thought to mark the end of the first phase of human ES cell research. It brings together a series of authors who have contributed significantly to the field and it balances chapters discussing the basic biology of ES cells with others discussing their differentiation along specific lineages and eventual application. Despite the focus on ES cells, two early chapters provide useful comparative reviews of recent studies of adult stem cell plasticity and of mesenchymal stem cells. Further chapters address potential issues that will need to be addressed as derivatives of human ES cells are developed for eventual clinical application. Included here are two interesting and useful reviews of the ethical, legal and intellectual property aspects of human ES cell research and application.

Undoubtedly, research in the new field of human ES cell biology is beginning to advance rapidly, so that it might be considered that the present volume

will become rapidly obsolete. However, its well-organized and well-written chapters provide a valuable reference to the current state of the field for newcomers and established human ES cell researchers alike. Although our understanding of molecular mechanisms and the means of manipulating human ES cells is likely to change significantly in the future, much of what is contained in this volume will remain fundamental, and so of value to those working in this exciting new area of research for quite a few years to come.

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